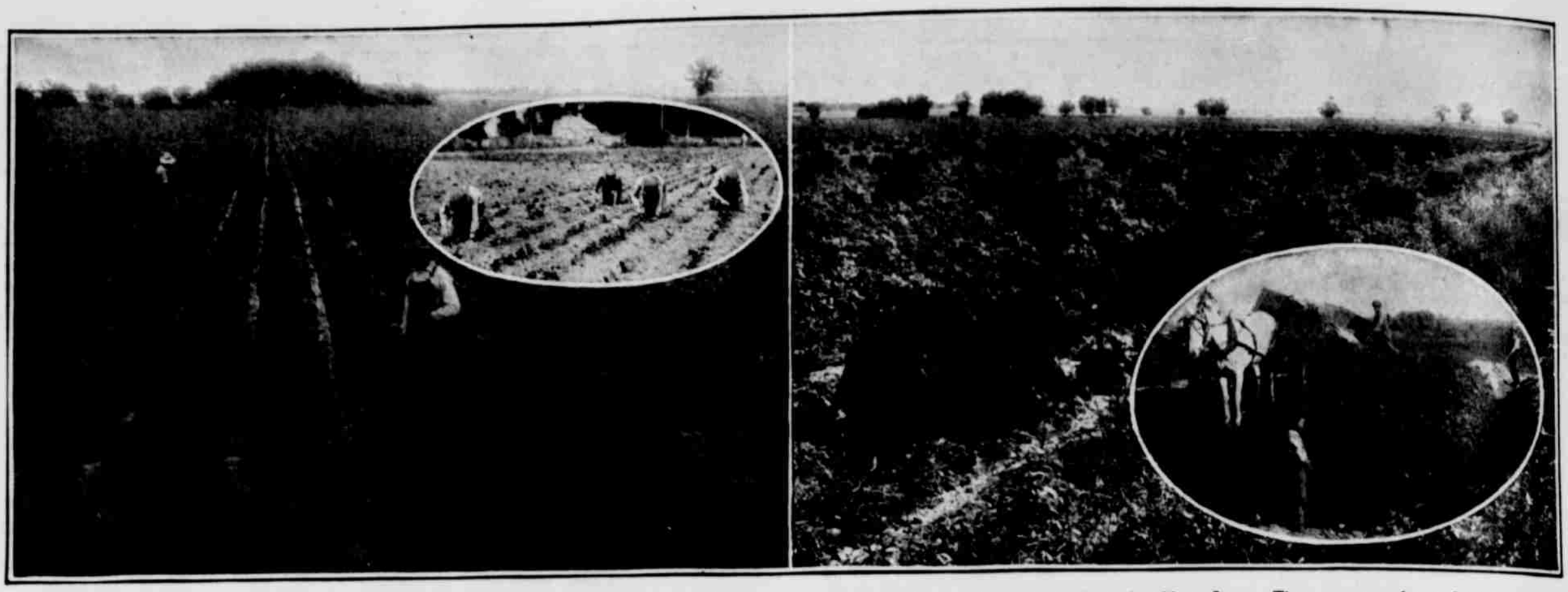

Irrigating a fine stand of sugar beets. Insert—Blocking and thinning sugar beets. This is an arduous undertaking. Blocking consists in cutting out all the beets in a row except a clump about every eight inches, while thinning consists in eliminating all except one beet in each clump.

Beet seed harvested and piled prior to thrashing. Insert—There are many by-products in the case of sugar beets. The beet tops left after harvest make good stock feed. Here they have been gathered up and are being placed in a pit silo for winter feeding.

Filling the Great Sugar Bowl of America

By R. P. CRAWFORD

IT'S A big job, this filling the great American Sugar Bowl. Year by year America's sweet tooth has been growing bigger and bigger until, just before the war restrictions were imposed, every individual in the United States was eating approximately 84 pounds of sugar a year, or about one-third as much sugar as potatoes or flour. One century ago an individual got along with just about one-tenth as much sugar. Some times, as during the sugar boom of a year or so ago, the far seas are combed for sugar with which to supply our sweet tooth.

It's a great romance, this filling the American Sugar Bowl. There is probably no more enticing business romance anywhere than the story of how in about 25 years America's production of beet sugar increased 50 times. There is scarcely a greater plant romance than the story of the mysterious processes by which the sugar beet plants put carbon dioxide and water together and produce sugar. There is no greater scientific romance than the work the world's scientists have done in tripling the sugar content of these same beets. There is no greater factory romance than the very complicated means by which these same beets are turned into sugar.

It's full of great possibilities, this filling the American Sugar Bowl. We seem to be still in the very infancy of beet-sugar making, and apparently there is no kind of agriculture that is so filled with great potentialities. Although it was not generally heralded, and although its promoters did not receive war decorations for so doing, the development of sugar beet seed growing in this country was one of the agricultural triumphs of the war. It sounds simple enough, but it is one of the most complicated kinds of seed production in the world.

But since we all eat sugar, let us take a look at this sugar business. I know Friend Housewife is going to ask a lot of questions before I get through, too. She has a sort of feeling that she got badly duped in this sugar business a year or so ago, when the price went kiting. Then just as soon as she got her preserving done, down came the price of sugar. Mrs. Housewife informs me that it looked like there was plenty of sugar all along and that the price was simply put up. Well, the speculators got their fingers burned good and plenty, anyway, as we shall see later.

Under normal conditions, the domestic cane and beet fields supply about one-fourth of the sugar used in this country, the planters of Hawaii, Porto Rico, and the Philippines another fourth, while Cuba, together with small amounts contributed by other countries, furnishes approximately one-half. The beet sugar production in this country represents about 15 to 20 per cent of our total sugar consumption. The cane sugar production in this country is of comparatively small consequence, when the refining of imported cane is left out of consideration. Because of the great possibilities and the tremendous strides that it has taken in the last few years, beet sugar forms the subject of this article. From less than 39,000,000 pounds in the early 90's, America's beet sugar production jumped to 2,180,042,000 pounds in 1920.

But to satisfy Mrs. Housewife's question, we do not have to go back very far. On January 1, 1920, the world's estimated production of sugar for 1919-20 was about 15 per cent short of the pre-war years, 1913-14. There was apparently a decrease in the visible domestic supply—in households and stores—and the Cuban crop later gave indications of being smaller than had been at first anticipated. Everybody began anticipating a shortage and the result was that everybody began to buy. The more they bought the more the price rose. The more the price rose, the more attractive the American market seemed. Speculators and brokers began searching the world for sugar, and supplies were purchased from Africa, Java, China, Formosa, Japan, India, South America, and Central America, in addition to the amounts that could be obtained from the usual sources. In fact, 48 different countries contributed to the sugar supply of the United States. I am told that the thrifty Dutch actually shipped back the sugar they had purchased over here when the price began rising, and made a very handsome profit. Everybody began to sell us sugar.

The president of a great sugar company said:

"Abruptly the situation changed, shipping conditions improved, domestic shipments to the trade arriving in larger volume, outside sugars began to arrive in substantial quantities, banking credits became more restricted, the demand ceased, there was hysterical and futile endeavor to unload, prices tumbled precipitately even as they had vaulted upward, declining continuously until the middle of December, 1920, when, after a drop of nearly 19 cents, raws reached 4.63 cents, duty paid, and refined 7.75 cents a pound, less two per cent, a decline tragic in its commercial consequences."

We had simply obtained more sugar than we needed and the bubble had burst. I am informed by two of the largest beet sugar companies that during the sugar boom they did not sell any sugar at more than $12 a hundred. They claim that the big money was made by the speculators, and I have been told that often a car changed hands several times en route, each time at an advance in price.

The other day I sat in the office of a great sugar company. An international authority on sugar beet growing pointed to a map stretched across the wall. There, marked on this map in colors, was a great belt zig-zagging across the northern part of the United States. "Everywhere in that great belt it is possible to grow sugar beets, that is, if there is moisture enough," said this sugar expert. I noticed that the belt began at the Atlantic sea coast, extended across New York, Pennsylvania, the northern part of Ohio, Indiana, Illinois, and Iowa; the southern part of Michigan, Wisconsin, and Minnesota; across most of South Dakota; and then southwestward through Nebraska, Colorado, and New Mexico; westward across Arizona; and then in a northern direction through Utah, Idaho, and a good part of Washington and Oregon. In addition, most of the state of California was included.

This is the theoretical sugar beet belt of the country, although there are modifying conditions. In fact, the sugar beet attains its greatest perfection where there is a 70-degree average temperature during June, July and August. It has been found possible to grow sugar beets in warmer climates, but for some unknown reason these beets are usually deficient in sugar. In Southern California, and in some parts of Arizona and New Mexico, the high summer temperatures may be partly overcome by starting the beets in the winter or early spring.

However, the moisture is always a limiting factor and there are many places in this sugar beet belt where the beets cannot be grown because of insufficient water. This is true of the Nebraska sand hills, for instance. The water must come either in the form of snow (in the winter) or rain, or irrigation. Some of the most successful sugar beet districts are those in the western part of the United States, where irrigation is practiced.

I can recall nothing finer than suddenly to come upon an irrigated valley in one of our western states, with everywhere the very striking green of the beet fields, stretching like a carpet toward the purple mountains. If it be the autumn of the year, everywhere there is the bustle of activity. The fields are dotted with Russian or Mexican laborers pulling and topping the beets. The roads are lined with the huge beet wagons hauling the product to the factories or to the beet dumps. Lines of coal cars stand at every dump, being loaded with beets to be transported to the nearest factory. In many places there are great piles of beets, 15 or 20 feet high, and perhaps a block long, which have had to be deposited out in the open because the factories are now running at capacity. By the time winter begins in earnest the beet campaign, as the season is known at the factories, will be at an end, and these huge piles of beets will have been converted into a fit product for America's great sugar bowl. The hundreds or so factories in the United States are running night and day during the autumn months.

The preparation for the successful sugar campaign has been in progress months before the harvest, and it might truthfully be said that it has been in progress for years. The development of the sugar beet has not been a thing of the moment. When one recalls that in Napoleon's time—Napoleon was one of the great apostles of beet sugar—the beets yielded from four to six per cent sugar and now yield from 12 to 20 per cent, one gets some idea of the progress that has been made in the industry.

Were it not for the great work accomplished by the seed breeders of the world, the sugar beet would soon revert to the low sugar content of its ancestors. The beet seed industry is most important to the success of the sugar industry itself. Now for the first time America has been making tremendous progress in growing its own beet seed. When the war cut off the foreign supply of seed, American factories were compelled to arrange for supplies of seed for their growers.

It is a complicated procedure for the scientists who really aim to improve the beets being grown. At first the system was to pick out the high-yielding beets and use the seed from them. But it later dawned upon the scientists that the descendants of a high-yielding beet did not necessarily have high-yielding qualities. So it became necessary to harvest the seed from each high-yielding beet separately and plant it in plots by itself. It was found that some beets transmit high-yielding qualities to their offspring, while others do not. All the descendants of a beet which do not come up to standard are discarded, even though some among them might be high-yielders. A long route had to be traveled in developing the sugar beet.

But there are still more complications in the producing of sugar beet seed. With a poor seed wheat, the yield may be cut down, but with poor beet seed the sugar content may be so low as to render the entire crop worthless, as far as sugar production is concerned. As Dr. F. S. Harris, director of the Utah Agricultural Experiment Station, so aptly said, "If two grades of seed were obtainable, one that would produce beets having 14 per cent and the other beets with 16 per cent, with equal yield, it would pay the sugar company to take the better seed if it sold for a dollar a pound and the poorer seed could be obtained for nothing.

"If a stand of wheat is poor, this condition can be overcome by the stooling of the plants. More than 100 heads of wheat have been reported to come from a single seed. But beets have no such power to make up for a thin stand. The roots may be somewhat larger where they are not crowded; but if many of the seeds fail to germinate, it is impossible to procure a satisfactory yield."

It is no wonder that the sugar companies have taken so much interest in the procuring of good beet seed, since the entire industry is dependent upon it. Approximately 15,000,000 pounds of beet seed are required each year. Figures for 1919 indicated that approximately 7,000,000 pounds of beet seed had been grown in this country. Before the war probably not one-twentieth of the beet seed used here was produced in the United States.

But even the production of the seed itself has its complications. It takes two years to produce a crop of beet seed, since the plant is biennial. Seed is usually sown a little later the first year than in the case of the beets being grown for commercial production. Ten to 16 pounds of seed are sown an acre, and to keep the roots from growing too large, the crop is not thinned. These small beets are known as stecklings. In the autumn the tops of the stecklings are cut off with a mower, and the roots are harvested and placed in pits dug in the ground for the winter. Early the next spring these small roots are set out. The beet roots start quickly and soon the field is covered with the seed stalks, which some times grow as much as two inches a day.

Usually the seed is ready to harvest early in August. The stalks are cut close to the ground with hand sickles and are then shocked. In 15 or 20 days they are dry enough to thrash. In some localities the seed is stacked so that it can be thrashed later on. The seed is usually thrashed out with ordinary grain separators, which have been specially equipped for the operation. The yield of beet seed an acre is about 1,000 pounds, although it varies from 300 to 3,000 pounds.